ASSEMBLY FOR A HYDRAULIC DASHPOT

The present invention concerns an assembly for a hydraulic dashpot. The dashpot is accommodated in a housing that is partitioned into two compartments by a shock-absorbing piston mounted on one end of a piston rod and accordingly traveling back and forth inside the housing. Dashpots of this genus can be solid walled or hollow-walled. The shock-absorbing piston is transversed by fluid-conveying channels provided with stacks of cupsprings that open and close to control the flow in both the vacuum phase and the pressure phase.

Low-amplitude oscillations sometimes reach the piston rod and break the cupsprings loose, leading to irregular shock absorption. European Patent 1 152 166 A1 proposes counteracting this tendency using another, vibration-compensating, piston hydraulically paralleling the shock-absorbing piston but accommodated in a subsidiary housing. The vibration-compensating piston in one embodiment is mounted on the face of the shock-absorbing piston more remote from the piston rod. There is a drawback here in that rod's radial moment of support is too short. In one alternative embodiment, the vibration-compensating piston is mounted in an adaptor between the end of the piston rod and the shock-absorbing piston. Here again there are drawbacks--the design is complicated and the shock-absorbing piston is of course not as rigidly fastened to the piston rod.

The object of the present invention is to eliminate the drawbacks inherent in the state of the art described in the forgoing and to improve the design and position of the vibration-compensating piston, ensuring a solid and reliable connection between the shock-absorbing piston and the piston rod while allowing as much of the piston rod as possible to find support inside the housing.

This object is attained in accordance with the present invention in an assembly of the aforesaid genus by the characteristics recited in Claim 1. This embodiment has several advantages. Specifically, a vibration-compensating piston accommodated in a subsidiary housing can be simple in design and simple to install at the end of the piston rod upstream of the shock-absorbing piston, allowing the greatest possible radial support for the piston rod against the housing by way of the shock-absorbing piston.

Practical alternative and advanced embodiments of the present invention are recited in Claims 2 through 7.

One embodiment of the present invention will now be specified with reference to the accompanying drawing.

The sole figure represents a cross-section through the dashpot at the end of the piston rod.

The dashpot is provided with an overall housing 1 with a solid cap at one end and a cap perforated by a central bore at the other, and is full of shock-absorbing fluid. A piston rod 2 travels into and out of the housing through the bore.

A shock-absorbing piston 3 is mounted on the end of piston rod 2 and slides back and forth against the inner surface of housing 1. A cuff 4 of low-friction material seals shock-absorbing piston 3 off from housing 1.

Breaches 5 allow the fluid to flow through shock-absorbing piston 3 and are individually closed off on one face by a stack of cupsprings 6. Depending on the direction being traveled by piston rod 2, cupsprings 6 either act as checkvalves or determine the level of shock absorption in accordance with how rapidly the fluid is flowing through breaches 5.

Shock-absorbing piston 3 is mounted around a bolt 7 at one end of piston rod 2 and secured there by a nut 8.

The section 9 of piston rod 2 adjacent to bolt 7 is wider than the bolt. A subsidiary housing 10 is mounted around section 9 before shock-absorbing piston 3 is introduced. Subsidiary housing 10 accommodates an annular piston 11, which it must accordingly be sectional to accept, a characteristic not illustrated in the

drawing.

Subsidiary housing 10 is cylindrical, each base being provided with a central bore, slightly wider in the illustrated example than section 9 of piston rod 2. Accommodated in these bores are seals 12 and 13. The edges of seals 12 and 13 are provided with flanges 14 and 15 that radially overlap the upper and lower surfaces of housing 10, sealing it off radially from section 9. Flanges 14 and 15 rest radially against piston rod 2 at the top and against a gasket 16 interposed between shock-absorbing piston 3 and housing 10 at the bottom. Tolerances can be compensated by the resilience of flanges 14 and 15.

Annular piston 11 travels back and forth axially inside subsidiary housing 10 and is radially sealed off against section 9 of the piston rod and against the inner surface of the housing. The space 17 accordingly created at the top of housing 10 communicates hydraulically with the dashpot's upper shock-absorption compartment 19 by way of bores 18. The lower shock-absorption compartment 20 communicates hydraulically with the space 23 at the bottom of housing 10 by way of transverse bores 21 and of a longitudinal bore 22 through the axis of the piston rod. As piston rod 2 oscillates at low amplitudes in relation to overall housing 1, annular piston 11 will travel back and forth axially inside subsidiary housing 10 without lifting cupsprings 6

off of breaches 5.

Since the axial motion of annular piston 11 is limited by the length of subsidiary housing 10, the magnitude of the amplitudes that can be handled by the vibration-compensating piston is also limited. The flanges 24 and 25, resting against the inner surface of subsidiary housing 10, of seals 12 and 13 can be of flexible plastic to cushion the impact of annular piston 11 against the base of subsidiary housing 10.

The annular piston 11 in the illustrated embodiment is in two identically shaped halves that rest together face to face. The piston travels along the inner surface of subsidiary housing 10 sealed tight by a centering-and-sealing cuff 26. Cuff 26 is subject to tension applied by an O ring 27 that can also help keep the components of annular piston 11 together, although the same task can be otherwise performed. Annular piston 11 is sealed off against section 9 of the piston rod by a two-part seal comprising a loosely sliding ring 28 and another O ring 29.

The circumference of section 9 need not, as illustrated, be graduated down to the circumference of bolt 7 or piston rod 2. It can also equal these circumferences.